

REMARKS

STATUS OF THE APPLICATION

The instant divisional application was filed on June 20, 2003. In an Office Action dated October 5, 2005 the Office has rejected claims 1-32. In view of the amendments to the claims and the discussion presented herein below, Applicant submits remaining claims 1-29 are patentable over the cited prior art and the instant application is in condition for allowance. An early notification of such allowance is therefore earnestly solicited.

THE OFFICE ACTION

The Office has rejected claims 28-32 under 35 U.S.C. second paragraph as being indefinite. The Office indicated that claims 28 and 29 were dependent on apparatus claims, but called for "the method of claim 19". Correction was required. The Office also noted that claims 30-32 were apparatus claims with no structural limitations, correction was required.

The Office has also rejected claims 1-32 under the judicially created doctrine of obviousness-type double patenting over: 1) claims 1-29 of copending Application number 11/057,636; 2) claim 44 of copending Application number 10/185,246; 3) claims 1-29 of copending Application number 10/702,377; and 4) claims 1-50 of copending Application number 10/465,250.

Finally, the Office has rejected claims 1-32 under 35 U.S.C. 103(a) as being unpatentable over JP 02-182433 in view of JP 08-221812 and either of U.S. Patent numbers 4,244,683 or 3,882,207.

DISCUSSION

The 35 U.S.C. 112, Second Paragraph Rejection

The Office has rejected claims 28-32 under 35 U.S.C. second paragraph as being indefinite. The Office indicated that claims 28 and 29 were dependent on apparatus claims, but called for "the method of claim 19". Correction was required. The Office also noted that claims 30-32 were apparatus claims with no structural limitations, correction was required.

Claims 28 and 29 have been amended to call for "the apparatus of claim 19" and claims 30-32 have been canceled. Thus these rejections have been corrected or are now moot.

The Provisional Obviousness-Type Double Patenting Rejections

The Office has rejected claims 1-32 under the judicially created doctrine of obviousness-type double patenting over:

- 1) claims 1-29 of copending Application number 11/057,636;
- 2) claim 44 of copending Application number 10/185,246;
- 3) claims 1-29 of copending Application number 10/702,377; and
- 4) claims 1-50 of copending Application number 10/465,250.

Attached hereto is a terminal disclaimer to overcome the obviousness-type double patenting rejections. Thus these rejections are no longer tenable.

THE REJECTION UNDER 35 U.S.C. 103(a)

The Office has rejected claims 1-32 under 35 U.S.C. 103(a) as being unpatentable over JP 02-182433 in view of JP 08-221812 and either of U.S. Patent numbers 4,244,683 or 3,882,207.

The Office suggests that the Japanese KoKai 08-221812 ('812) teaches the use of a punch when embossing a web of substrate material to melt form an optical disc pattern on at least one surface of the web. The Office indicates that punch member 80 is used to make a hole in the web of substrate material.

Applicants contend that a thorough reading of the published Japanese KoKai '812 (via a machine translation provided by the JPO, a copy of which is attached hereto) indicates that the "punch" does not cut a hole in a web of substrate material as it is being melt formed, but rather pushes unsolidified polymer back into the supply lines before the the additional layer which is being molded onto a preformed polymer substrate is hardened by UV radiation. That is, the "punch" merely pushes liquid material back out of the mold and becomes a central portion of the mold as the prepolymer is solidified. The '812 reference does not teach or suggest cutting a whole in the web of substrate material as it is being melt-formed from an initially solid web of substrate material, but merely provides a method for eliminating unwanted prepolymer before the add-on layer is polymerized.

Further, one of ordinary skill in the art would not have combined the '812 reference with JP 02-182433 ('433) to achieve the present invention. The '812 reference is an injection molding process which is significantly different than the embossing technique of the '433 patent. In fact, if the method of '812 patent were combine with the '433 patent absurd results would be derived. The "punch" would not be able to force the semi-molten

plastic of the web into any tubes without it solidifying and clogging the system. The system of the '433 patent could not be adapted to coat the web with a prepolymer which would subsequently be solidified, and the "punch" would not be able to push the prepolymer back out of the filling tube because the web of substrate material would be in the way. It is clear from the '812 reference that the substrate that the prepolymer is molded to already has a through-hole before it is placed into the mold.

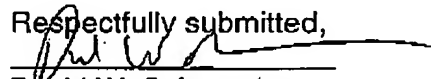
Thus the the '433 and '812 references do not teach or suggest, individually or in combination the present invention as embodied in claims 1-29. Applicants respectfully request the withdrawal of such as rejection.

CONCLUSION

In view of the amendments to the claims and the discussion above, applicant submits that the present application is now in condition for allowance and earnestly request the re-examination and timely notice of allowance thereof.

Should the Examiner have an comments or suggestions which would place the instant application in better condition for allowance, he is earnestly requested to contact the undersigned.

Respectfully submitted,


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JP,08-221812,A [DETAILED DESCRIPTION]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the manufacture approach of optical recording media, such as a videodisk or a compact disk, and its equipment, and relates to a detail further at the manufacture approach of a multilayer optical recording medium, and its equipment.

[0002]

[Description of the Prior Art] Generally the optical disk which is the conventional optical recording medium is made from transparence resin matter, such as polymethyl methacrylate (polymethyl methacrylate) or a polycarbonate (polycarbonate). This optical disk has the structure possessing the transparence substrate which has the recording surface which turns into a top face from the pit (pit) of a predetermined pattern, the reflective film by which the metal was carried out increase arrival and formed by the vacuum evaporation approaches, such as sputtering, on this transparence substrate, and the protective coat or substrate formed on said reflective film. Under the present circumstances, the pit pattern of said reflective film and said transparence substrate is formed spirally.

[0003] The information recorded on the optical disk constituted as mentioned above comes to be read as the optical information reflected from the reflective film by the optical means, i.e., a pit pattern. However, the structure of such a conventional typical optical disk has the demerit in which the capacity is not enough in applying to the disk with which storage of mass information, for example, speech information, or image information is demanded.

[0004] The multilayer optical-recording-medium-on the other hand structure as law which makes large information storage capacity hold by this is proposed. 1979 Philips -- a reflection coefficient -- difference -- the optical-recording-medium structure of multilayer record playback of having a reflecting layer has been proposed (U.S. ***** No. 4450553), the 1st reflecting layer of 1988 Pioneer Electronic Corp. will be silicon, and the 2nd reflecting layer has proposed the multilayer optical-recording-medium structure which consists of aluminum (U.S. ***** No. 5126996)

[0005] One example of the optical disk which is such a multilayer optical recording medium is shown in drawing 6. The 1st reflective film 13 formed in the top face of the 1st transparence substrate 11 which consists of a PVC (polyvinyl chloride) plate with a thickness of about 1mm, the 1st resin layer 12 by which the upper part of this 1st transparence substrate 11 was equipped with the 1st recording surface, and this 1st resin layer 12 possesses this. And it is in the upper part of said 1st reflective film 13. 0.15mm The resin layer 15 in which the 2nd recording surface which consists of a PVC plate of the thickness of extent was formed is formed, and 2nd transparence substrates 18 which have the 2nd reflective film 17 are consisted of by the upper part of this resin layer 15.

[0006] The conventional multilayer optical recording medium constituted as mentioned above consists of reflected light study structures of at least two layers, and the 1st reflective film 13 and the 2nd reflective film 17 in each optical structure are constituted so that it may have the reflection coefficient which is different from each other. It is easy to read the information indicated by the reflective film, so that the luminous intensity reflected from said 1st reflective film 13 and the 2nd reflective film 17 is strong, and the ratio of incident light and the reflected light is dependent on the number of said optical structure.

[0007] Since the condition of information record was influenced by the precision of the pit formation with the above detailed multilayer optical recording media, the various approaches of the optical recording medium for forming the pattern of a still more elaborate pit were shown. Among these, the approach of pouring in resin, making carry out photo-curing of this, and forming a recording layer between the substrates and La Stampa in which the reflecting layer was formed, is the U.S. patent 5171392nd. It is indicated by the number.

[0008] Moreover, the approach mentioned above and other similar approaches use a nozzle 40 etc. for the top face of La Stampa 20 which has a recording layer as shown in drawing 7, and apply resin to predetermined width of face. The

open width of the resin which was pressurized and was minded between said La Stampa 20 and transparence substrates 30 after combining the transparence substrate 30 with which the resin layer 31 and the reflecting layer 32 were formed so that mutual opposite may be carried out as shown in drawing 8 and drawing 9 where resin is applied to La Stampa 20 as mentioned above is made to be carried out between them. Where it pressurized as mentioned above and resin is applied, in order to carry out photo-curing of said resin to the transparence substrate 30 by the side among [1 / at least] La Stampa 20, light is irradiated from the light source 25, resin is stiffened, and the resin layer 33 is made to form.

[0009] Forming the resin layer which has two or more recording surfaces by the above approaches, and manufacturing a multilayer optical recording medium has the following troubles. Since spacing of a transparence substrate and La Stampa, i.e., the thickness of a resin layer, changes with pressures applied to the 1st, spacing accommodation with La Stampa and a transparence substrate is difficult. Adjustment of the amount of resin supplied between said La Stampa and transparence substrates is difficult for the 2nd, and it has many amounts of loss of the amount of resin.

[0010] It is at the completion time of formation of said resin layer, since resin flows out between said La Stampa and transparence substrates, the special process for removing this is required for the 3rd, the production cost by this also becomes high, and, moreover, there is a problem which cannot aim at improvement in productivity, either. There is a problem to which the rate of an imprint will be bad and the air discharge between pits will not become [4th] smooth if the ram speed which pressurizes these becomes quick at the time of the pressurization of La Stampa and a transparence substrate.

[0011]

[Problem(s) to be Solved by the Invention] The purpose is in the purpose of this invention offering the manufacture approach of the multilayer optical recording medium which is created in order to solve the above mentioned trouble, can reduce the number of production processes, can aim at improvement in productivity, and may raise the **** of the pit for information record, and its equipment.

[0012]

[Means for Solving the Problem] In the manufacture approach of the multilayer optical recording medium which, as for this invention, a reflecting layer and the 1st recording layer are formed in order on a transparence substrate in order to attain the aforementioned purpose, and forms the resin layer which has the 2nd recording layer on said 1st recording layer. The transparence substrate with which said reflecting layer and 1st recording layer were formed, and the 1st step which makes mutual predetermined spacing maintain La Stampa which has a recording layer on the top face of La Stampa, The 2nd step which intercepts at least one of the through tubes formed in the center of said predetermined spacing ***** transparent substrate and La Stampa, and pressurizes and supplies resin between said transparence substrates and La Stampa through other one through tube, The manufacture approach of the multilayer optical recording medium characterized by coming to provide the 3rd step which removes the resin which remains in said through tube is offered after completion of supply of said resin. In the manufacturing installation of the multilayer optical recording medium which, as for this invention, a reflecting layer and the 1st recording layer are formed in order on a transparence substrate in order to attain said purpose, and forms the resin layer which has the 2nd recording layer on said 1st recording layer. Up metal mold and lower metal mold which possess the attachment section in which it is prepared and said transparence substrate which counters, and La Stampa are attached, respectively so that mutual opposite may be carried out, and possess a transparence substrate, the through tube formed in the center of La Stampa, and the free passage hole opened for free passage, The manufacturing installation of the multilayer optical recording medium characterized by coming to provide the punch member prepared in the through tube of said lower metal mold possible [a slide] by the predetermined rise-and-fall means and the resin supply means formed in the through tube of said up metal mold is offered. In this invention, a resin cutoff means to intercept exsorption of the resin supplied from said resin supply means possesses further in the at least 1 side of the edge of said vertical section metal mold.

[0013]

[Embodiment of the Invention] Hereafter, this invention is explained to a detail based on the attached drawing. The manufacture approach of the multilayer optical recording medium by this invention is for forming the resin layer which has the 2nd recording layer in the top face of the 1st recording layer of the transparence substrate with which the approach for manufacturing the multilayer optical recording medium which has at least two or more recording layers was started, and the laminating of a reflecting layer and the 1st recording layer was further carried out to the detail.

[0014] In order to form in the top face of said 1st recording layer the resin layer which has the 2nd recording layer, as shown in drawing 2, La Stampa 100 which has a recording layer 101 on the top face of the transparence substrate 50 in which a reflecting layer 51 and the 1st recording layer 52 were formed in order is maintained by mutual predetermined spacing. And as shown in drawing 3, at least one through tube 102 is intercepted among the through tubes 53, 102 formed in the center section of the transparence substrate 50 which left only predetermined spacing, and La Stampa

100, and resin is pressurized and supplied through the through tube 53 which is not intercepted between the 1st recording layer 52 of said transparency substrate 50, and La Stampa 100. It is desirable for it to be intercepted between said transparency substrates 50 and edges of La Stampa 100 at the time of supply of resin, and to make it the pressurized resin not flow out of between the 1st recording layer 52 of the transparency substrate 50 and the edges of La Stampa 100 here.

[0015] If supply of resin is completed as mentioned above, the resin which remains in the through tubes 102 and 53 of La Stampa 100 and the transparency substrate 50 will be removed, and a through tube will be made not to be intercepted with resin. And after irradiating the resin layer 200 minded between La Stampa 100 and the transparency substrate 50 through said transparency substrate and making it harden ultraviolet-rays light as shown in drawing 4 and drawing 5, the resin layer 200 and La Stampa 100 which were formed in the top face of the 1st recording layer 52 of said transparency substrate 50, i.e., a transparency substrate, are separated. And the reflective film and a protective coat are formed in the top face of a resin layer in which said 2nd recording layer 201 was formed, and manufacture of a multilayer optical recording medium is completed.

[0016] As mentioned above, it can prevent shortening the impregnation time amount of resin sharply by pressurizing and pouring in resin between the transparency substrate 50 and La Stampa 100 at the time of manufacture of a multilayer optical recording medium, or that can do and air permeates between the transparency substrate 50 and the resin layer 200 especially. And by repeating and giving the approach mentioned above, laminating formation of the resin layer which has a recording layer is carried out, and a multilayer optical recording medium can be manufactured.

[0017] The manufacturing installation of the multilayer optical recording medium for forming a resin layer in a transparency substrate As shown in drawing 1, the transparency substrate 50 and the free passage holes 61 and 71 opened for free passage by the through tube 53, 102 formed in the center section of La Stampa 100, respectively are formed. The up metal mold 60 and lower metal mold 70 with which it had the attachment sections 62 and 72 in which the transparency substrate 50 formed so that mutual opposite may be carried out, and La Stampa 100 are attached, respectively, It is divided roughly into the punch member 80 prepared in the free passage hole 71 of said lower metal mold 70 possible [sliding] by the predetermined rise-and-fall means, and the resin supply means 90 formed in the free passage hole 61 of said up metal mold 60.

[0018] The up metal mold 60 with which the transparency substrate 50 with which said reflecting layer 51 and 1st recording layer 52 were formed is supported consists of the transparent quality of the material of Xtal etc. And said attachment sections 62 and 72 with which the up metal mold 60 and the lower metal mold 70 were equipped are equipped with a usual attachment means (not shown) to carry out vacuum adsorption and to attach said transparency substrate 50. Although the punch member 80 formed in the free passage hole 71 of said lower metal mold 70 is formed possible [rise and fall] by rise-and-fall means, such as a cylinder, the top dead center of said punch member 80 is located in the free passage hole of said up metal mold 60, and, as for a bottom dead point, it is desirable to be located in the through tube 102 of La Stampa 100. Furthermore, as for said rise-and-fall means, it is desirable that you make it operate when the pressure of the resin supplied between La Stampa 100 and the transparency substrate 50 is more than a predetermined pressure.

[0019] Said resin supply means supplies the resin by which melting was carried out between said La Stampa 100 and transparency substrates 50, possesses the nozzle 91 attached at the free passage hole 61 of said up metal mold 60, and is constituted. And in the edge of said up metal mold 60 or the lower metal mold 70, a resin cutoff means 95 to prevent possesses further that the resin supplied between said transparency substrates 50 and La Stampa 100 leaks out. Although this resin cutoff means 95 consists of a lobe 96 by which die-length extension of predetermined is carried out from the edge of the up metal mold 60 at the perpendicular lower part 70, i.e., lower metal mold, side, hole 96a which prevents the outflow of air is formed in the at least 1 side of this lobe 96. The non-explained sign 300 is the light source which stiffens the resin supplied between said transparency substrates and La Stampa.

[0020] Thus, in order to form the resin layer 200 which has the 2nd recording surface in the top face of the transparency substrate 50 in which said reflecting layer 51 and 1st recording layer 52 were formed using the manufacturing installation of the multilayer optical recording medium by constituted this invention, the transparency substrate 50 is attached in the attachment section 62 of said up metal mold 60, and La Stampa 100 is attached in the attachment section 72 of said lower metal mold 70. this condition -- said up metal mold 60 and lower metal mold 70 -- ****(ing) -- spacing maintenance predetermined in said transparency substrate 50 and La Stampa 100 -- it is made to be carried out.

[0021] Under the present circumstances, the edge of the punch member 80 established in the free passage hole 71 of said lower metal mold 70 possible [sliding] is located in the interior of the free passage hole 71. And resin is supplied between the transparency substrate 50 and La Stampa 100 through the nozzle 91 of said resin supply means 90. The resin which it is at the completion time of said resin supply, and was located in the edge of the transparency substrate

50 ceases to flow out outside by the lobe 96 of resin cutoff. If supply of resin is completed in the above operations and the pressure between the transparence substrate 50 and La Stampa 100 rises, when said rise-and-fall means operates and the punch member 80 goes up, a nozzle 91 side will be pressurized and the resin located in the through tube 53,102 of the transparence substrate 50 and La Stampa 100 will be removed.

[0022] If supply of resin is completed as mentioned above, after irradiating the light from the light source 300 prepared in the upper part of up metal mold, i.e., ultraviolet rays, and stiffening resin, while separating the resin layer 200 and La Stampa 100 in which the 2nd recording layer 201 was formed, the transparence substrate 50 is separated from the up metal mold 60 by carrying out mold separation of the up metal mold 60 and the lower metal mold 70. In addition, in this invention, although the manufacture approach of a multilayer optical recording medium and its equipment explained the optical recording medium of two layers as an example The technical thought of this invention is not limited to this, of course, it is applicable to the structure more than two layers, and this invention is not limited to the aforementioned example, but it has many clear deformation for it to be possible by those who have the usual knowledge in a field for the time being within the technical thought to which this invention belongs.

[0023]

[Effect of the Invention] The following effectiveness has carrying out laminating formation of the resin layer by which a reflecting layer, the 1st recording layer, and the 2nd recording layer were formed as mentioned above on the transparence substrate using the multilayer optical-recording-medium manufacturing installation. The variation by the thickness of the resin layer which pressurizes resin where between the transparence substrates and La Stampa which were supported by vertical section metal mold is maintained at predetermined spacing and by which the 2nd recording layer was formed in the 1st can be reduced.

[0024] It can prevent that 2nd resin is projected at the edge of a transparence substrate and an edge bar (edge burr) is generated. To the 3rd, the adhesion condition of each class formed on the transparence substrate is made good, and the rate of an imprint may be raised. The formation time amount of a resin layer is contracted to the 4th, and improvement in productivity can be aimed at.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the sectional view having shown the manufacturing installation of the multilayer optical recording medium by this invention.

[Drawing 2] It is the sectional view having shown gradually the manufacture approach of the multilayer optical recording medium by this invention.

[Drawing 3] It is the sectional view having shown gradually the manufacture approach of the multilayer optical recording medium by this invention.

[Drawing 4] It is the sectional view having shown gradually the manufacture approach of the multilayer optical recording medium by this invention.

[Drawing 5] It is the sectional view having shown gradually the manufacture approach of the multilayer optical recording medium by this invention.

[Drawing 6] It is the sectional view showing the conventional optical-recording-medium structure excised in part.

[Drawing 7] It is the drawing in which the approach for forming the resin layer which has the 2nd conventional recording surface was shown gradually.

[Drawing 8] It is the drawing in which the approach for forming the resin layer which has the 2nd conventional recording surface was shown gradually.

[Drawing 9] It is the drawing in which the approach for forming the resin layer which has the 2nd conventional recording surface was shown gradually.

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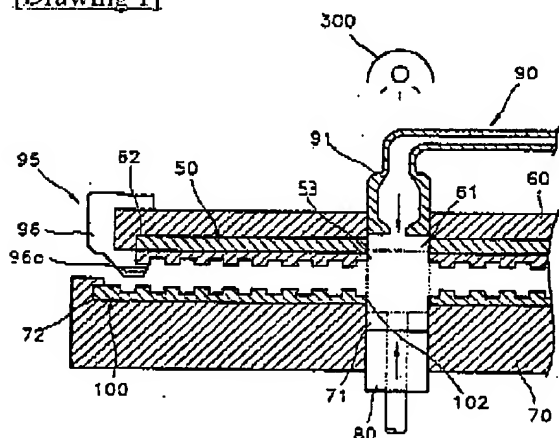
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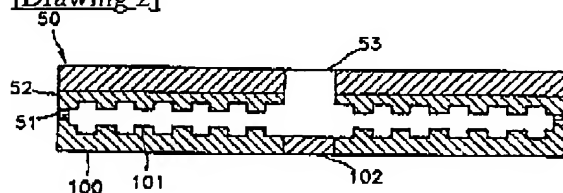
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DRAWINGS

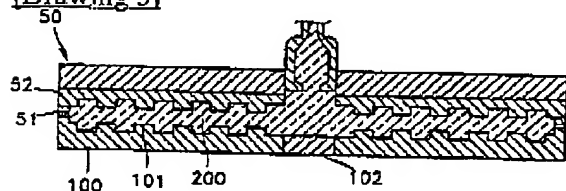
[Drawing 1]



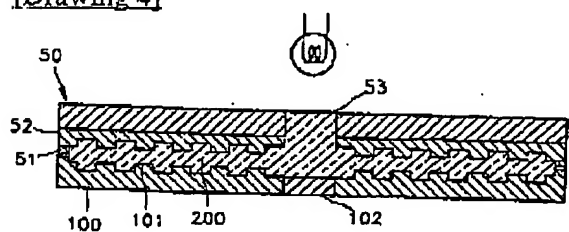
[Drawing 2]



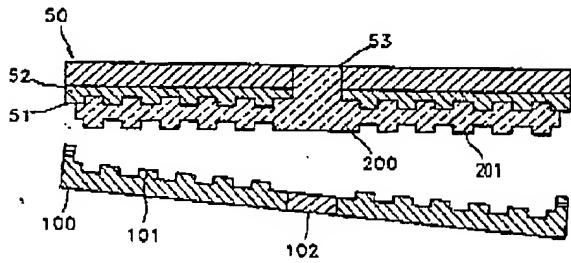
[Drawing 3]



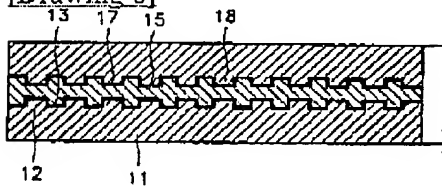
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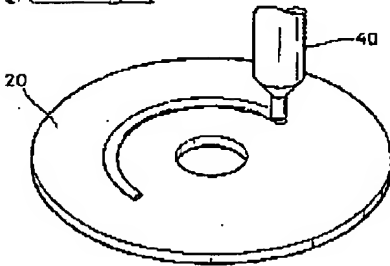
[Drawing 5]



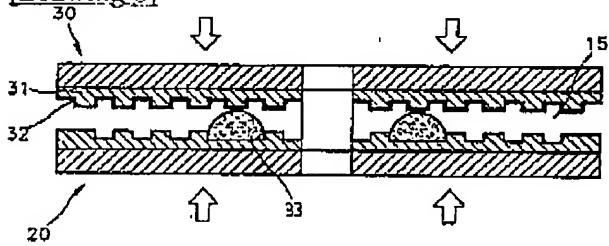
[Drawing 6]



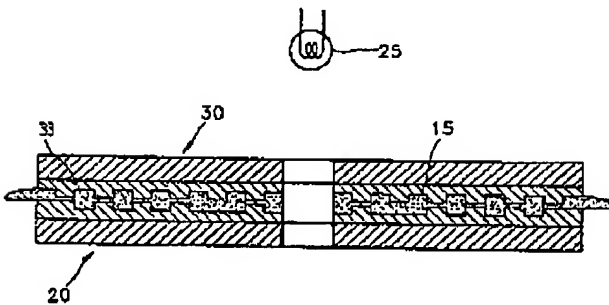
[Drawing 7]



[Drawing 8]



[Drawing 9]



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JP,08-221812,A [CLAIMS]

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CLAIMS

[Claim(s)]

[Claim 1] In the manufacture approach of the multilayer optical recording medium which a reflecting layer and the 1st recording layer are formed in order on a transparence substrate, and forms the resin layer which has the 2nd recording layer on said 1st recording layer The 1st step which makes mutual predetermined spacing maintain La Stampa which has a recording layer on said transparence substrate and top face, The 2nd step which intercepts at least one of the through tubes formed in the center of the transparence substrate predetermined [said] by which spacing isolation was carried out, and La Stampa, and pressurizes and supplies resin between said transparence substrates and La Stampa through other one through tube, The manufacture approach of the multilayer optical recording medium characterized by providing the 4th step which stiffens the resin supplied between the 3rd step which removes the resin which remains in said through tube after completion of supply of said resin, and the 1st recording layer on said transparence substrate and La Stampa, and being constituted.

[Claim 2] The manufacture approach of the multilayer optical recording medium according to claim 1 characterized by forming two or more resin layers which apply repeatedly on said formed resin layer, and have other recording layers on said resin layer in order instead of applying the 1st thru/or said 4th step to said transparence substrate.

[Claim 3] In the manufacturing installation of the multilayer optical recording medium which a reflecting layer and the 1st recording layer are formed in order on a transparence substrate, and forms the resin layer which has the 2nd recording layer on said 1st recording layer The lower metal mold with which it had the attachment section by which La Stampa is attached in the part which is prepared so that it may counter with the up metal mold with which it had the attachment section in which said transparence substrate is attached, and said up metal mold, and counters with said attachment section, The manufacturing installation of the multilayer optical recording medium characterized by coming to provide the punch member prepared in the through tube of said lower metal mold possible [sliding] by the predetermined rise-and-fall means, and a resin supply means to be combined with the through tube of said up metal mold, and to supply resin to a predetermined pressure.

[Claim 4] The manufacturing installation of the multilayer optical recording medium according to claim 3 characterized by a resin cutoff means to intercept possessing further that the resin supplied to at least one edge from said resin supply means among said vertical section metal mold is leaked.

[Claim 5] The manufacturing installation of the multilayer optical recording medium according to claim 3 characterized by said up metal mold consisting of the transparent quality of the material.

[Claim 6] The manufacturing installation of the multilayer optical recording medium according to claim 3 characterized by coming to provide the light source which light is irradiated [light source] in the upper part of said up metal mold, and stiffens resin.

[Claim 7] The manufacturing installation of the multilayer optical recording medium according to claim 5 characterize by coming to provide the light source which light is irradiated [light source] in the upper part of said up metal mold, and stiffens resin.

[Claim 8] The manufacturing installation of the multilayer optical recording medium according to claim 4 with which said resin cutoff means is characterized by coming to provide the lobe extended by the perpendicular lower part from the edge of said up metal mold.

[Claim 9] The manufacturing installation of the multilayer optical recording medium according to claim 8 characterize by forming in said lobe the hole with which air is discharged.

[Translation done.]